WHAT IS CLAIMED IS:

1. A linear oscillator comprising:

a moving part reciprocating;

a case containing incorporating said moving part; and

an amplitude control spindle supported in said case to be movable,

wherein said moving part and said amplitude control spindle reciprocate at a resonance frequency of said linear oscillator or a frequency in a vicinity thereof.

2. The linear oscillator according to Claim 1, comprising:

an electromagnetic driving part housed in said case, for reciprocating said moving part; and

a spring member disposed at least between said case and said moving part, and between said case and said amplitude control spindle, for forming a spring oscillation system,

wherein a resonance frequency of said spring oscillation system is equal to a resonance frequency of said linear oscillator or a frequency in a vicinity thereof.

3. The linear oscillator according to Claim 1, wherein said moving part and said amplitude control spindle reciprocate at a resonance frequency moving in respective phases opposite to each other and.

4. The linear oscillator according to Claim 2, in which

said spring member includes:

a first spring disposed between a fixed part comprised of said case and said electromagnetic driving part and said moving part;

a second spring disposed between said moving part and said amplitude control spindle; and

a third spring disposed between said amplitude control spindle and said fixed part.

5. The linear oscillator according to Claim 2, wherein said electromagnetic driving part includes a coil to thereby use a coil current, thus enabling controlling a reciprocating motion.

6. The linear oscillator according to Claim 5, wherein said electromagnetic driving part includes:

a coil surrounding an outer periphery of said moving part;

second yokes each disposed at each of both ends of said coil;

a pair of permanent magnets which are each disposed on an end face of each of said second yokes and which are magnetized symmetrically with respect to a center of said coil; and

first yokes provided on sides of said permanent magnets opposite to said second yokes respectively.

7. The linear oscillator according to Claim 1, wherein a

shaft for taking out an motion output is connected as a connection element to said moving part or said amplitude control spindle.

8. The linear oscillator according to Claim 4, wherein said second spring is stronger in spring force than said first and third springs.

9. The linear oscillator according to Claim 1, wherein said amplitude control spindle is provided with rocking preventing means for preventing rocking.

10. The linear oscillator according to Claim 2, wherein:

said spring member is formed of a coil spring; and

mass of said amplitude control spindle and a connection element thereof is larger than mass of said moving part and a connection element thereof.

11. The linear oscillator according to Claim 2, wherein:

said spring member is formed of a leaf spring; and

mass of said amplitude control spindle and a connection element thereof is smaller than mass of said moving part and an element thereof.

12. The linear oscillator according to Claim 6, wherein at least a portion of said case facing said electromagnetic driving part is made of a magnetic substance and a thickness of a magnetic substance facing said electromagnetic driving part is 7% or more of an outer diameter of said permanent magnets.

13. The linear oscillator according to Claim 6, wherein magnetic flux increasing means is provided for increasing a quantity of magnetic flux running toward said moving part.

14. The linear oscillator according to Claim 6, wherein said first yokes each have a triangular cross section having a side facing said case being a slope.

15. The linear oscillator according to Claim 7, wherein said shaft is partially or entirely made of a nonmagnetic substance.

16. The linear oscillator according to Claim 15, wherein only a piercing portion of said moving part passing through said shaft is made of a nonmagnetic substance.

17. The linear oscillator according to Claim 6, wherein said yokes or said moving part are provided with eddy current loss reducing means for reducing an eddy current loss.

18. The linear oscillator according to Claim 17, wherein said moving part has a slit formed therein in an amplitude direction.

19. The linear oscillator according to Claim 6, wherein said moving part has a large diameter portion at both ends thereof in a reciprocating direction thereof and a small diameter portion at a center thereof in such a configuration that a boundary between said large diameter portion and said small diameter portion may roughly agrees with an end face of said second yoke on a side of said coil and that both end faces

of said moving part in a reciprocating direction roughly agree with end faces of said permanent magnets on sides of said first yokes.

20. The linear oscillator according to Claim 6, wherein a gap between an outer peripheral surface of said moving part and an inner peripheral surface of said yokes is non-uniform in an revolutionary direction.

21. The linear oscillator according to Claim 7, wherein revolution restricting means is provided for restricting axial revolution of said shaft.

22. The linear oscillator according to Claim 21, wherein said spring member operates as said revolution restricting means.

EXPLANATION OF REFERENCE NUMERALS

1 plunger,

5 coil,

7 shaft,

9 amplitude control spindle, and

10 shield case.